

# UK QPIC activities

ITU Webinar QIT 2 Nov 2021

Anchored In



# We are Anchored in Quantum

1. Innovation Consultancy working with companies, universities, RTO's & policy makers
2. Active in Quantum Technologies since 2014
3. Facilitate UK QPICs Initiative



# Background

## PICs

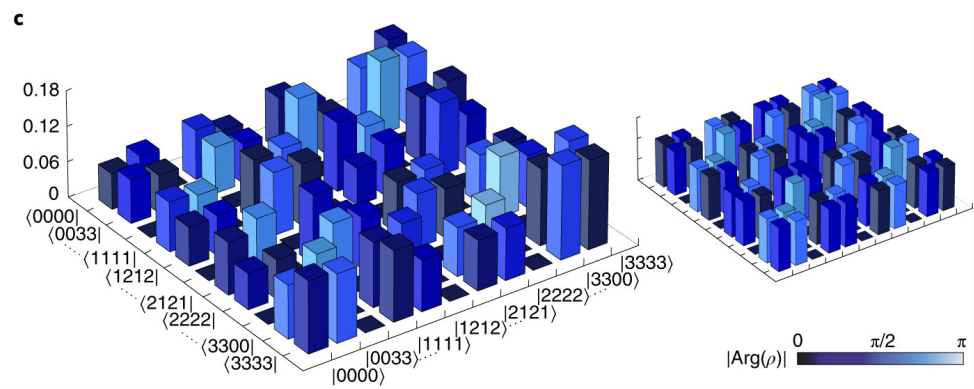
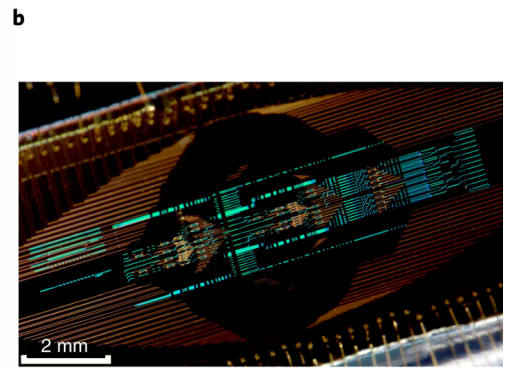
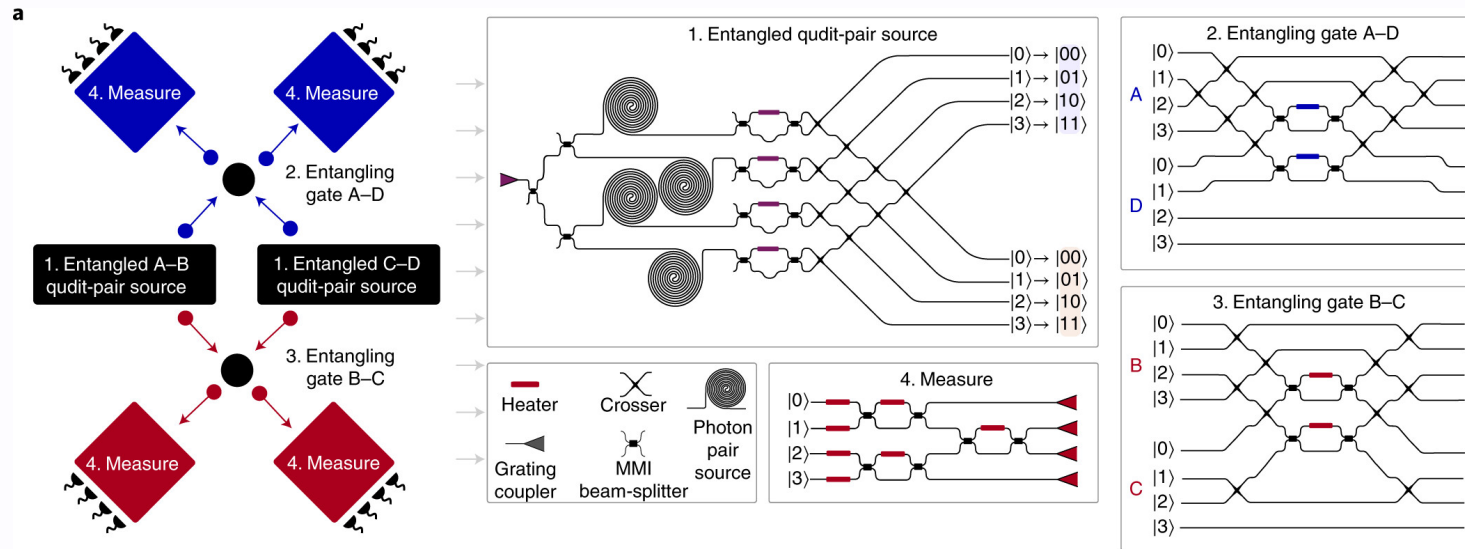
1. UK has a history in PICs for Telecommunications
2. Very active research base in integrated photonics
3. Industry active in PICs

## QPICs

- PSI Quantum
- UK National UK Quantum Program
- Increasing need for integration, miniaturization, robustness

# Some examples from the UK Application: computing

On-chip generation of multiple pairs of entangled photons  
 Modular system on Silicon Photonics platform



Bristol University,  
 Nature Physics  
 2021

# Some examples from the UK Application: computing

Integrated quantum circuit for Bell state Generation and analysis

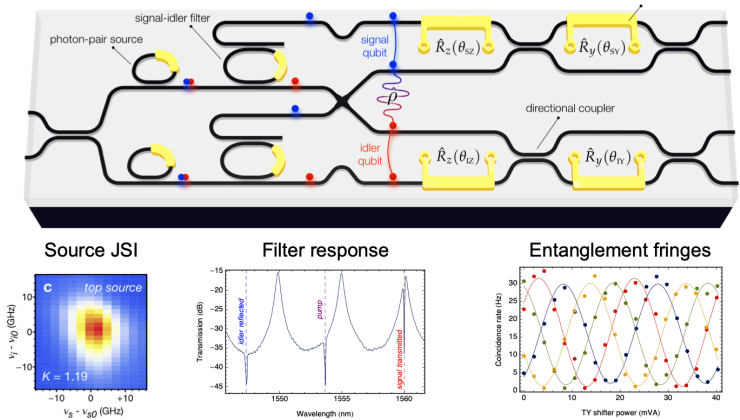
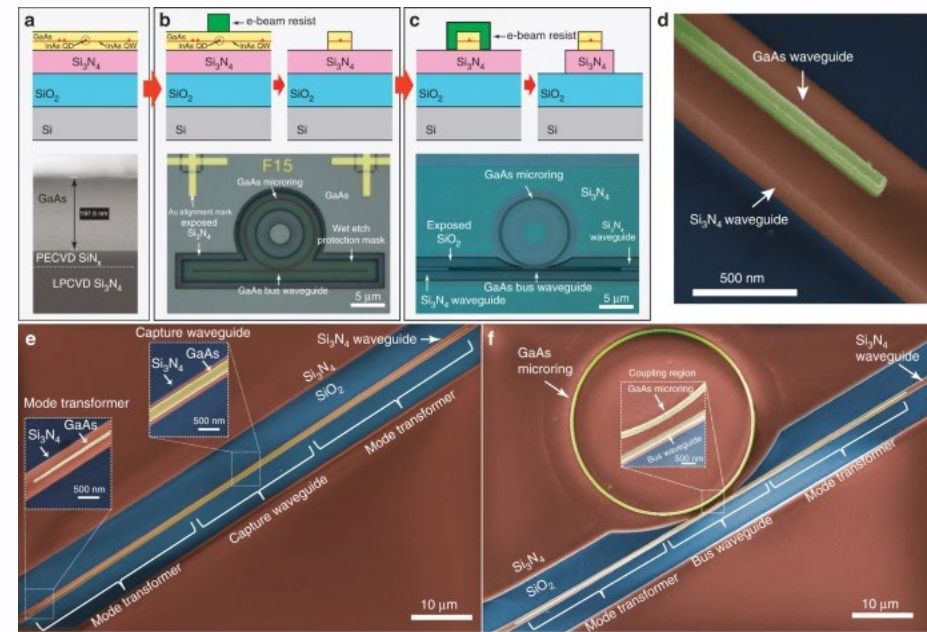


Figure 2: Integrated quantum circuit for on-chip Bell state generation and analysis

Bristol University, Silverstone et al.

Source: <https://doi.org/10.1109/OMN.2016.7565856>

Heterogeneous integration for on-chip quantum photonic circuits with single quantum dot devices

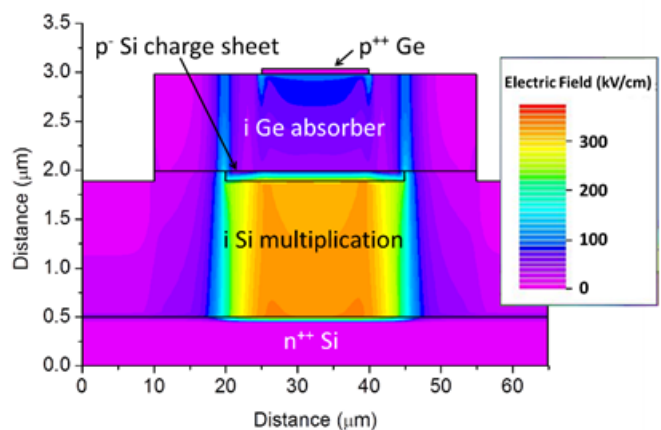


Southampton University, M. Davanco et al.

Source: <https://www.nature.com/articles/s41467-017-00987-6>

# Some examples from the UK Single Photon Sources & Detectors

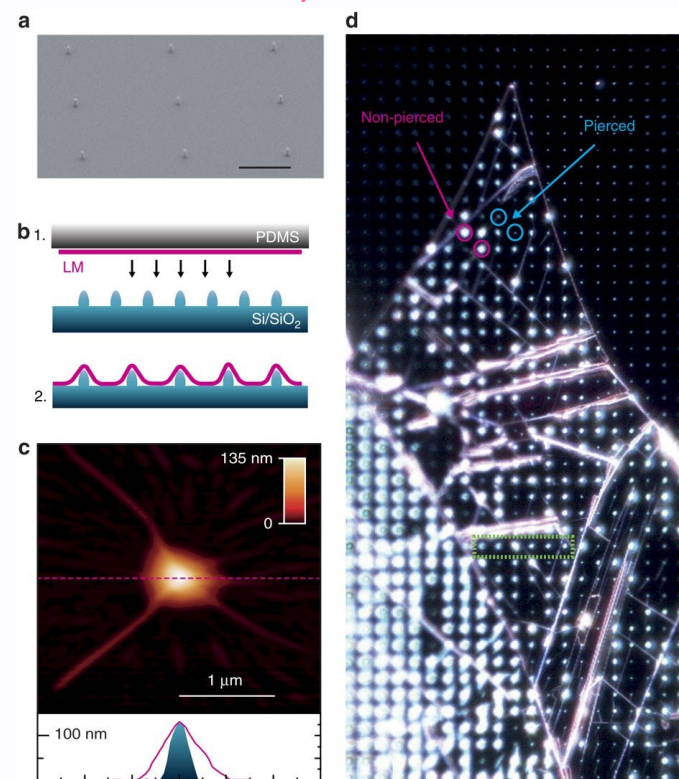
Planar Ge on Si SPAD Detector. Single photon detection



Heriot Watt University, Single Photon Group

<https://www.single-photon.com/projects/spad>

Quantum Emitter Arrays (nano pillars fabricated by electron beam lithography)



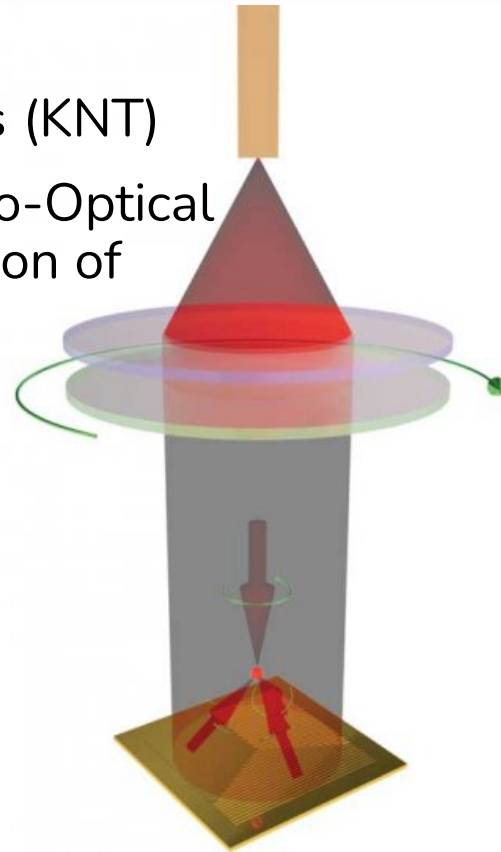
Cambridge University,  
Cavendish Laboratory,  
Carmen Palacios-Berraquero, Dhiren M. Kara et al.

# Some examples from the UK **Application Sensing**

## gMOT

(Kelvin Nanotechnologies (KNT))

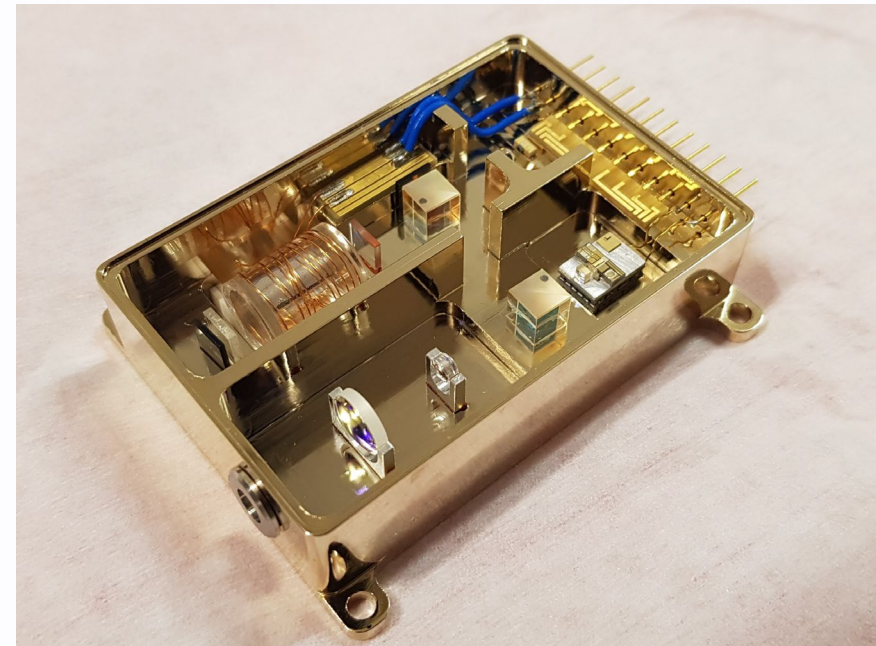
Compact grating Magneto-Optical Trap chip for the generation of ultra-cold atoms.



Source:  
<https://www.kntnano.com/quantum-otgrating/>

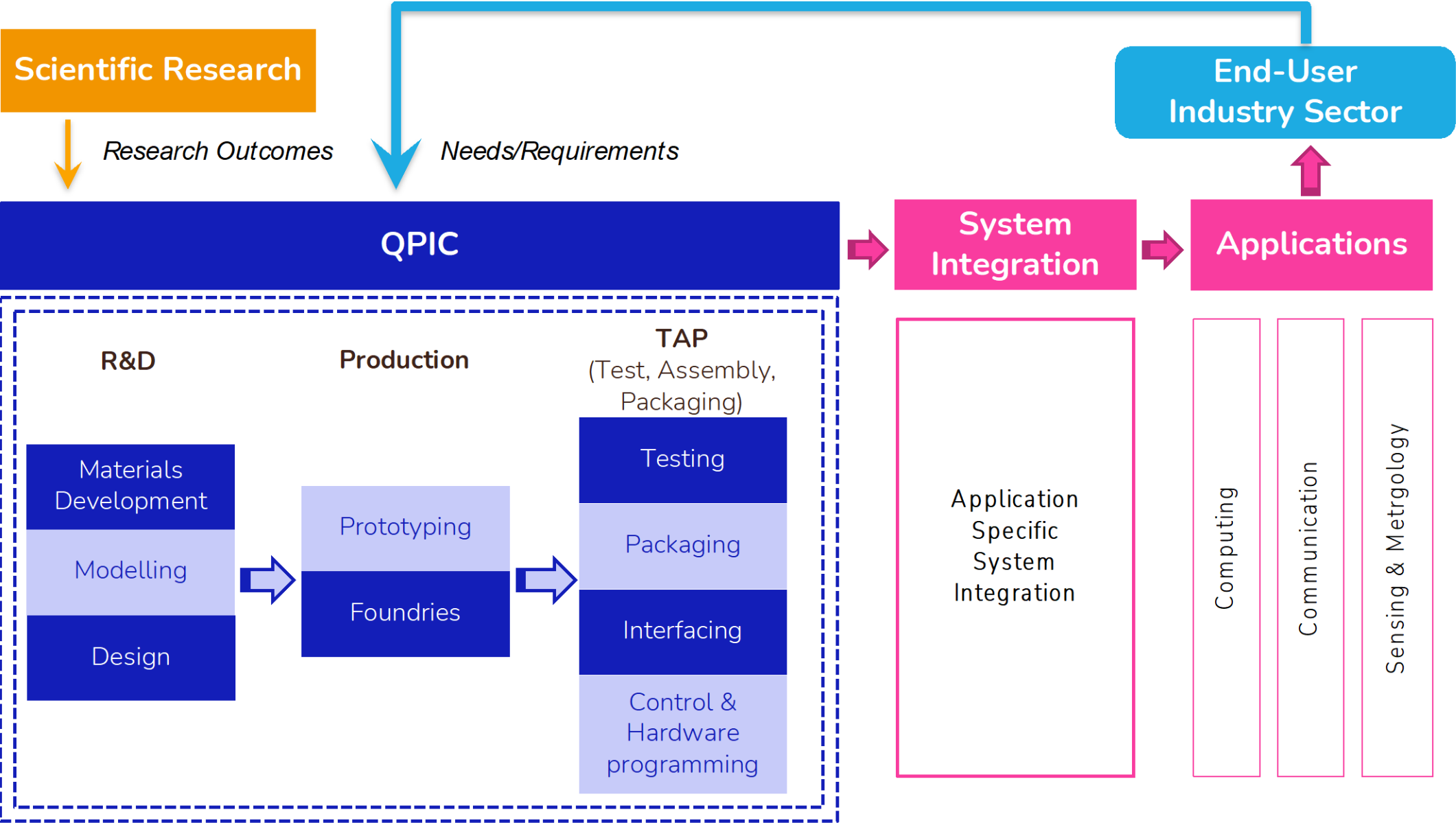
## FLAME (Alter Technologies)

Frequency – Stabilised Laser Modules with Integrated Reference Cell



<https://wpo-altertechnology.com/products/flame-frequency-stabilised-laser/>

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Fraunhofer CAP

KNT

Glasgow University

Strathclyde University

Duality Photonics

KETS

CSA Catapult

CSC

Quantum Dice

Wave Photonics

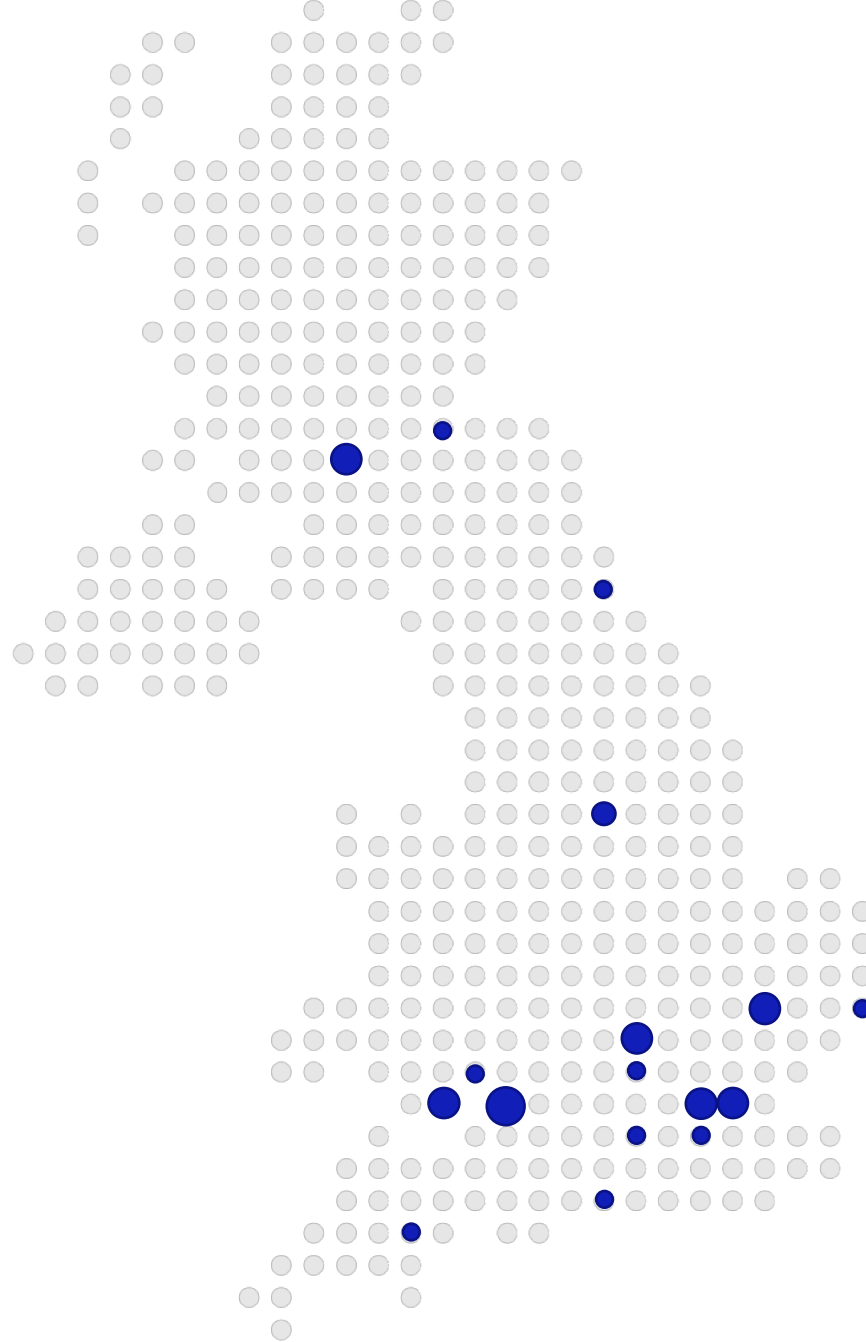
Quantrol

IQE

Cardiff University

Bristol University

Bay Photonics



Heriot Watt University

Alter Technologies

Helia Photonics

INEX

AegiQ

Sheffield University

Cambridge University

British Telecoms

Toshiba

Nu Quantum

ORCA Computing

UCL

NPL

Quantopticon

Resolute Photonics

Senko

Southampton University

# UK QPIC Network

35+

UK Organisations interested



Realising quantum technologies with integrated photonics

# QUPID

## We identified common barriers:

- Understanding/identifying of common requirements
- Missing standards (testing, packaging, etc.)
- Tests/Quality Control proving functionality
- Translation to scale-up
- Improve turn-around times for prototyping
- Access to UK national supply chain

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